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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/570,643	03/30/2006	Dirk Zierer	CICTG-21-PCT-US (TIC 2003	1224
22827	7590	02/05/2010	EXAMINER	
DORITY & MANNING, P.A. POST OFFICE BOX 1449 GREENVILLE, SC 29602-1449			BUTTNER, DAVID J	
			ART UNIT	PAPER NUMBER
			1796	
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			02/05/2010	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/570,643	<b>Applicant(s)</b> ZIERER ET AL.	
	<b>Examiner</b> David Buttner	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 32-37 is/are pending in the application.
- 4a) Of the above claim(s) 9-11, 15-25, 33, 34, 36 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12-14, 32, 35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

Newly added claim 37 has eliminated the elected polyester from the list of possible "D" and is therefore considered nonelected.

Claims 13,14 and 35 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not seen how dianhydrides or diimides of tetracarboxylic acids could result in the  $-X-CO-(R_2-CO-)_m-X-$  structure of Claim 13 when  $R_2$  is limited to the specified hydrocarbon radicals of claim 1.

Claims 14 and 35 could not have  $-(R_2-CO)-$  be present if derived from a diester of carbonic acid such as diphenylcarbonate. "m" must be zero if diphenylcarbonate was used.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8,12,13,32 rejected under 35 U.S.C. 103(a) as obvious over Matsuzaki 4535127 in combination with JP60170652.

Matsuzaki teaches the claimed block polymer as explained below. Matsuzaki does not suggest adding this block polymer to polyoxymethylene.

JP60170652 teaches triblock polymers of polyoxymethylene blocks and elastomeric blocks can be added to polyacetal (ie polyoxymethylene) to improve toughness.

It would have been obvious to combine polyoxymethylene with Matsuzaki's block polymer for the expected improved toughness.

Matsuzaki teaches the claimed block polymer as explained below:

Matsuzaki exemplifies (#46) the production of a block polymer having a blocks of copolyoxymethylene from trioxane and ethyleneglycol formal (ie dioxolane) and a hydroxyl/carboxyl terminated polyesterurethane block from dicyclohexylmethanediisocyanate + ethyleneglycol + polyethylenedipate. The starting polyesterurethane block polymer is said to have one hydroxyl group and one carboxyl group (presumably at the terminals as at col 9 line 21) and therefore must have one of the two structure as follows:

(I)



(II)



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Upon reaction with the trioxane and ethyleneglycol formal the following results for (I):

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(I)

copolyoxymethylene-OCH<sub>2</sub>CH<sub>2</sub>-O(CO)(CH<sub>2</sub>)<sub>4</sub>(CO)O-polyesterurethane-O(CO)(CH<sub>2</sub>)<sub>4</sub>(CO)O-copolyoxymethylene

This fits applicant's formula with "A"= copolyoxymethylene

R1= -CH<sub>2</sub>CH<sub>2</sub>-

R2= -(CH<sub>2</sub>)<sub>4</sub>-

X=oxygen

m=1

D=polyesterurethane (ie a polyurethane type elastomer col 3 line 66 – col 4 line 17).

Similarly for (II):

Copolyoxymethylene-OCH<sub>2</sub>CH<sub>2</sub>-O(CO)NH- polyesterurethane-O(CO)(CH<sub>2</sub>)<sub>4</sub>(CO)O-copolyoxymethylene

This fits applicant's formula with "A"= copolyoxymethylene

R1= -CH<sub>2</sub>CH<sub>2</sub>-

m=0 at left side of molecule

m=1 at right side of molecule

R2= -(CH<sub>2</sub>)<sub>4</sub>-

X=nitrogen at left side of molecule

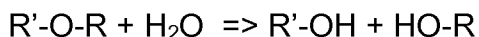
X= oxygen at right side of molecule

D=polyesterurethane (ie a polyurethane type elastomer col 3 line 66 – col 4 line 17).

Applicant's arguments filed 11/30/09 have been fully considered but they are not persuasive.

Applicant argues that oxybis(phthalic acid) which doesn't meet applicant's formula  $-X-CO-(R_2-CO-)m-X-$  can react with water to provide phthalic acid which does meet the formula.

This reaction is not known to the examiner. Water will certainly ring open the anhydride, but the examiner is doubtful that the ether can be hydrolyzed into separate compounds - especially lacking hydroxyls on the aromatic ring. Applicant will provide evidence that such a reaction was well known at the time of filing. Common ethers normally are hydrolyzed according to:



Applicant argues claims limited to using diesters of carbonic acid (eg diphenylcarbonate) depend on claim 1 which permit  $m=0$  in the formula  $-X-CO-(R_2-CO-)m-X-$ .

The examiner didn't reject claim 1 under USC 112. The problem lies in claim 14's use of  $-X-CO-(R_2-CO-)m-X-$ . Any claim limited to the use of diesters of carbonic acid must have  $m=0$ . Inclusion of extraneous/impossible linkages serve only to clutter/confuse the claim.

Applicant argues there is no way to determine how the dicyclohexyldiisocyanate, ethyleneglycol and poly(ethyleneadipate) will react together and it is impossible to determine/predict what the resulting structure will look like.

This is unconvincing. A minimal understanding of polymer chemistry leads one to the examiner's proposed structure(s). As recognized by applicant, Matsuzaki (col 3 line 66- col 4 line 17) teaches the combination of dicyclohexyldiisocyanate, ethyleneglycol and poly(ethyleneadipate) will react together to form a "polyurethane type elastomer". Example 46 clearly indicates that the resulting polymer has one carboxyl group and one hydroxyl group. These must be at the terminals as only difunctional monomers are present (ie the hydroxyl and carboxyl could not appear as a pendent group somewhere midchain).

Given that poly(ethyleneadipate) is the reaction product of adipic acid and ethylene glycol, the only carboxyl groups present in the starting materials are the adipic acid of the poly(ethyleneadipate). Therefore, one end of the polyurethane elastomer must be the residue of adipic acid. This is what is pictured in the examiner's proposed structures.

The only hydroxyl groups present in the starting materials are from ethylene glycol which must be at the other terminal which is also shown in the examiner's proposed structures. Basic urethane chemistry tells us that ethylene glycol will react with both the diisocyanate and the adipic acid. Therefore, the terminal ethylene glycol unit will be immediately adjacent to adipic acid residue OR immediately adjacent to diisocyanate residue. The former is shown by examiner's structure (I) and the later in structure (II).

Applicant's arguments regarding A-B-C-B block polymers and that single monomers qualify as a block are not understood. The examiner has not designated

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anything as a “C” block nor do applicant’s claims call for any “C” block. The examiner never states a single monomer qualifies as a “block”. The examiner has pointed out in excruciating detail how either possible structure of Matsuzaki’s example match up with the claimed structure.

Applicant’s argument that only a single diisocyanate monomer would be present in the reaction product resulting from the combination dicyclohexyldiisocyanate, ethyleneglycol and poly(ethyleneadipate) is nonsensical. Applicant recognizes that Matsuzaki terms his product a “polyurethane”. By definition, a polyurethane has multiple urethane units. Multiple diisocyanate units must be employed along the chain.

Arguments that the polyesterurethane of Matsuzaki does not qualify as applicant’s “D” are simply untrue.

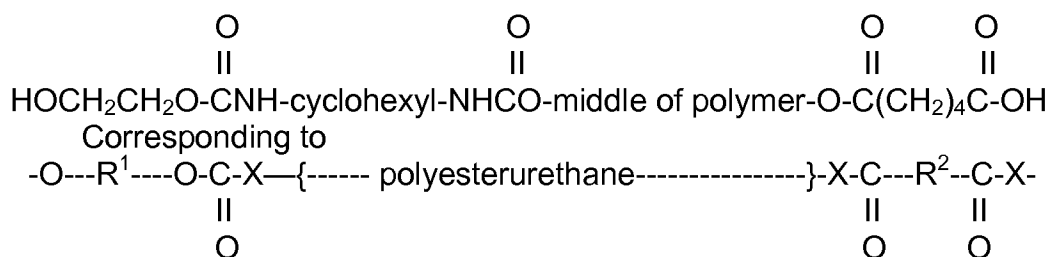
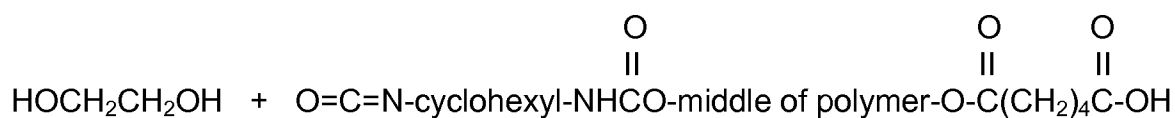
Polyesterurethanes are a type of “polyurethanes”. This is explicitly stated by Matsuzaki. Polyesterurethanes are also a type of “polyesters”. Both polyurethanes and polyesters are listed by applicant. Finally, Matsuzaki’s polyesterurethane is unquestionably derived from a polyester (polyethylenadipate). This is what is literally required by applicant’s claim.

Applicant’s argument that the examiner’s proposed structure (II) removed the (CO) group on one end of the diisocyanate leaving just the amine is false.

The reaction to arrive at proposed structure (II) is the reaction between ethylene glycol and the free isocyanate of the diisocyanate as follows:



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If the limitations of claim 14 or 35 placed into claim 1, then applicant must also:

- (1) cancel claims 13,15,16,17 and 18 drawn to alternative linking compounds;
- (2) Cancel or similarly limit nonelected process claims 19-25 and 36
- (3) remove the  $-(\text{CO}-\text{R}^2)_m-$  from the formula of claims 1,14,19 and 35 as "m" would necessarily be zero for diesters of carbonic acid. Leaving this in the formula leads only to confusion regarding the scope of the claim.
- (4) correct (or cancel) claim 11 and 34's "contains CO-units derived from ethylene or propylene" as applicant has not taught how carbonyl units are to be made from ethylene or propylene. Furthermore, the structure pictured by applicant for "D"  $-(\text{CH}_2-\text{CHR}^7)_q-$  does not permit any other units.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Buttner whose telephone number is 571-272-1084. The examiner can normally be reached on weekdays from 10 to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jim Seidleck, can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Buttner

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/David Buttner/

Primary Examiner, Art Unit 1796